NATIONAL GEOGRAPHIC SOCIETY

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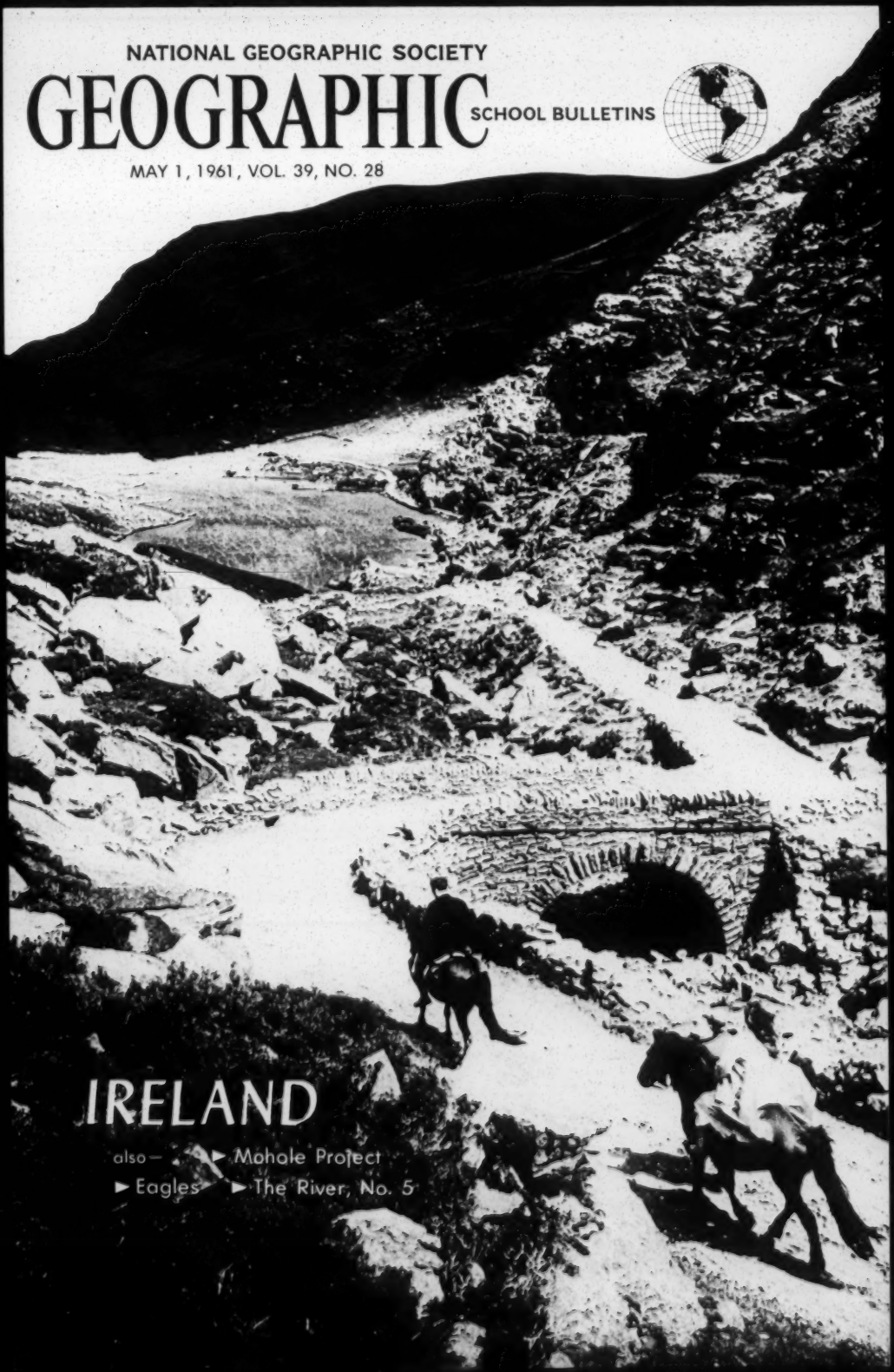

IRELAND

also—
► Mohole Project
► Eagles
► The River, No. 5

UMI

Textiles (especially linen), aircraft, business machines, chemicals, clothing, and soap are produced in Northern Ireland's capital, Belfast.

Dublin, shown at far left soaked in rain, is the Republic of Ireland's largest city, port, and holiday center as well as capital. One telephone directory of 611 pages serves the entire country. Dublin (in Gaelic, *Baile Atha Cliath*) occupies more than half the book.

More typical of Ireland are rural scenes. Snug white-washed cottages (right) stand among pastures near Carraroe on Galway Bay. Riders on the cover make their way through County Kerry's four-mile-long Gap of Dunloe, a narrow, boulder-strewn gorge. Donkey carts stand on market town streets, their owners hawking vegetables, the donkeys nibbling hay.

Because the land is poor, the population of the Republic has shrunk alarmingly: from six and a half million during the potato famines of the 1840's to less than three million today. Some 40,000 Irish men and women go abroad to seek their fortunes every year. Men of Achill Island off the west coast say more of their people live in Cleveland, Ohio, than at home. When Shaw wrote admiringly of Ireland, he was living in London.

The past is a vital part of modern Ireland. The 14-centuries-old preaching of St. Patrick is as near as today. (The Irish celebrate his day not with hilarious parades, but as a holy day.)

Ireland's Catholics still revere an island—St. Patrick's Purgatory—in Lough (Lake) Derg, County Donegal. There the saint is said to have had a vision of the souls for whom he was interceding. For centuries it has been one of Europe's famous places of penance. During the Middle Ages pilgrims spent nine days there in a dark cave and afterward told of strange visions. Today motorboats speed load after load of penitents to the church-crowned island.

Slim round towers, built as refuges from 8th and 9th century Viking raids, rise over the Irish landscape. Cells of the Skellig monastery, constructed without mortar at least 10 centuries ago, still perch, abandoned but well-preserved, 600 feet above the Atlantic on the rocky cliffs of Great Skellig.

Centuries-old moss-covered monasteries stud the quiet countryside. Lofty battlements of old castles rear stone heads above the woodlands. Five miles from Cork lies the village of Blarney and 500-year-old Blarney Castle with its famous stone supposed to

NATIONAL GEOGRAPHIC PHOTOGRAPHER VOLKMAR WENTZEL

IRELAND: *Divided island is poor in resources, rich in spirit*

NATIONAL GEOGRAPHIC PHOTOGRAPHER ROBERT F. SISSON, COVER AND ABOVE

"THERE IS no magic like that of Ireland. There are no skies like Irish skies," wrote George Bernard Shaw, one of Ireland's famous sons.

The green and lovely island west of England, Scotland, and Wales gives off earthy smells of rain-wet fields, peat smoke, and flowers. Rising between the Atlantic Ocean and Irish Sea, the land has been painted an emerald green by the rain-laden gales of the Atlantic. An old Irish saying has it that Ireland must be one of the cleanest places on earth because God washes it every day.

Rugged mountains of gray stone soar along the coasts to enclose a central lowland, giving Ireland a saucer shape. Green woodlands lead down to shimmering blue lakes, and rhododendrons line country lanes.

The whole island is not as large as Maine. It is divided into two parts. The Republic of Ireland, with 2,846,000 people in 27,136 square miles, blankets the biggest chunk. It has been independent since 1922. Northern Ireland, still part of the United Kingdom, holds 1,412,000 persons and 5,459 square miles. Northern Ireland is often called Ulster, though its border actually encloses only six of the nine counties of pre-partition Ulster.

Ireland's beauty is skin-deep. It is a hard land, with stones showing through its thin green coat, and very little in the way of minerals to fuel the industries that might bring wealth. This poverty of resources forces Ireland to import coal, oil, and steel for its few small industries: woolen mills, distilleries, breweries, tanneries, bacon-curing plants. Cork has automobile and tire factories.

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BRASSAI, RAPHO-GUILLUMETTE

Barefoot colleen of Inishere, one of the bleak Aran Islands, trudges homeward, back bent under a load of peat. The three Arans, Inishere, Inishmore, and Inishmaan (*inish* means island) are naked rocks rearing out of the sea at the mouth of Galway Bay. They hold little soil and no peat. Boats from Galway leave the precious fuel on the beaches to supply the homes of 1,700 fisherfolk. Surrounding waters yield cod, eels, herring, haddock, lobster, and salmon.

come more organized. Once, each craftsman produced his own weight and style. Now pilot factories supply the weavers with yarn and patterns.

Fair Day brings farmers into the villages to trade their livestock and produce. Shopkeepers barricade their windows against the cattle being herded down the streets. The fat porker (left) has made a break for freedom in Castleisland, County Kerry, but its guardian, though outweighed and off balance, hangs on. (The road marker points the way to Killarney in both Gaelic and English.)

Ireland's one dependable resource is peat, or turf, as the Irish call it. Bogs cover about one-seventh of the Republic. Turf fires provide warmth and heat the teakettle in farms and cottages.

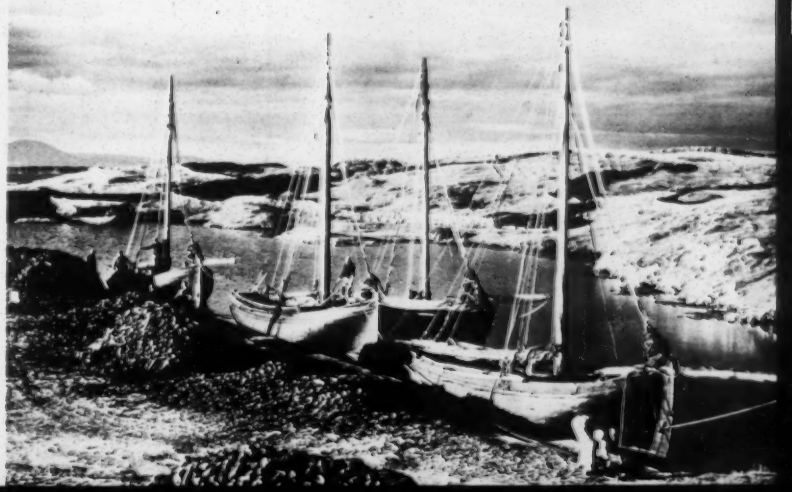
One of Ireland's most typical scenes is the man cutting turf, tossing the brick-shaped chunks to his son who loads them on a two-wheeled donkey cart. Boatmen at right load their hookers near Galway with dried peat bound for the rocky Aran Islands.

Not so typical yet, but at least in evidence, is the mechanical turf cutter, a 40-ton monster to harvest peat. At Portarlington a modern electric station burns 180,000 tons a year.

In all of Ireland, Mr. Morton found its people its greatest attraction. "Joyful and melancholy by turn," he wrote, "they exhibit in both moods a warmth one does not forget. In all their attitudes they exhibit the Celts' revolt against the despotism of fact; and their land is like them: melancholy in the mists that sweep across it, laughing and gay in the sunlight that turns the mountains purple.

"But beautiful as the land is, it does not support all its children. This fact lies behind all the Irish laughter and all the tears. Only a singularly insensitive traveler could remain unconscious of the tragedy which, to the benefit of other lands, has dispersed an ardent and attractive race about the world." L.B.

NATIONAL GEOGRAPHIC PHOTOGRAPHER VOLKMAR WENTZEL



NATIONAL GEOGRAPHIC PHOTOGRAPHER ROBERT F. SISSON

give the gift of gab to those who kiss it. "No one knows how the Blarney Stone got its reputation," writes H. V. Morton in the March 1961 *National Geographic*. "It is said, however, that in the time of Elizabeth I, the lord of Blarney was an expert in pleasant speeches and evasion. One day the Queen, angered by his excuses, cried, 'What? More Blarney!' and so gave a new word to the language. The custom of kissing the stone was unknown before the 18th century."

For a small and relatively barren island, Ireland has had a lot of covetous neighbors. First came hunters and fishermen from northern and southern Europe—possibly as long ago as 6,000 B.C. Then came Celts, from France and Spain, between 400 and 350 B.C. St. Patrick introduced Christianity in the 5th century. Its wealthy monasteries attracted Vikings and Normans to pillage and plunder. Finally in 1541 King Henry VIII of England proclaimed himself also King of Ireland. Four centuries of war between Catholic Ireland and Protestant England ended only in the 20th century when the southern part won independence and became the Republic of Ireland, or Eire.

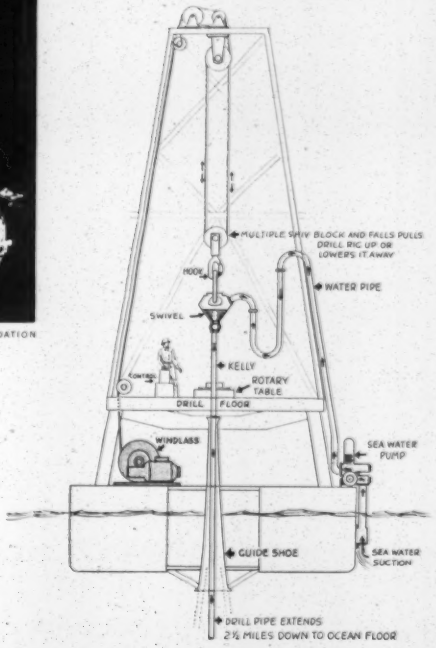
Today's Ireland is a land of small farms, small towns, and small thatched houses, some of them more than 100 years old. As his forebears have for centuries, today's Irishman lives off the earth. Where land is too hilly or swampy for barley, hay, potatoes, or wheat, he raises horses, sheep, pigs, poultry, or cattle.

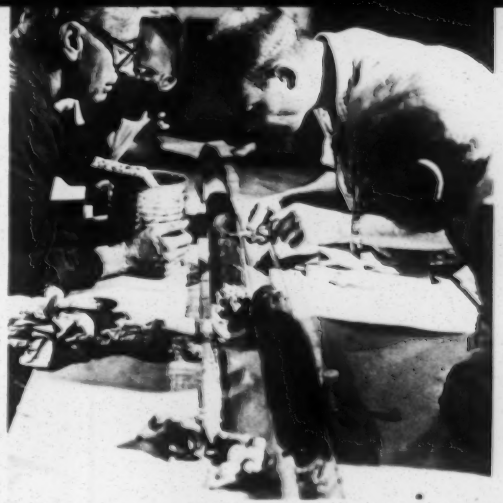
The County Galway farmer shearing a sheep (far left) is the backbone of one of Ireland's most famous industries: tweed making. The 10 pounds of wool on this animal is bound for the tweed factories of Donegal, headquarters for the Irish homespun industry. Many of these "factories" are primitive looms thumping away in cottages all over County Donegal. When the weather is too bad for chores, Donegal's farmers stay close by the peat fire, weaving speckled tweed. The Donegal weaver (left) carries finished cloth.

Though still a spare time cottage industry, tweed making has be-

NATIONAL SCIENCE FOUNDATION

Drilling at sea: In water too deep to allow anchoring the ship, the CUSS I (left) stays above the hole by use of four outboard motors, two on each side. Radar and sonar, reflected from anchored buoys, give the exact position. Below, a diagram of the drill rig.





SAMUEL W. MATTHEWS, NATIONAL GEOGRAPHIC STAFF

the crust is, in places, only 15,000 feet through.

The Mohole will reach from 30,000 to 35,000 feet deep, through roughly half water and half crust, before it reaches the mantle. After tests this month near Guadalupe Island off Mexico's west coast, scientists are certain the feat can be accomplished.

The drillers reached 601 feet beneath the ocean floor in 11,700 feet of water. Even this test has had important scientific results. For the first time, oceanographers have penetrated the "second layer," a sheet of basalt, or volcanic rock, under the first layer of ocean sediments. More knowledge will come from examination (above) of cores taken from the bottom by the drilling rig.

The tests proved that the Mohole is possible but that a larger ship and new equipment will be necessary.

While the rig is being sought, planners will decide on the site of the Mohole attempt. Scientists say they will take this first long step into inner space within five years. F.S.

UMI

Drilling for the Secrets of Inner Space

INNER SPACE has its mysteries, too. While satellites and astronauts whirl above, some scientists keep their attention firmly fixed on the Earth beneath their feet.

Through the use of new techniques, the National Academy of Sciences hopes to shed light on many basic problems, including the origin and evolution of life, and the make-up of Earth itself.

The husky "roughneck" at left aims a diamond-studded drill toward the secrets of the planet. The drill pipe will go through the bottom (below) of the ship CUSS I (right), which this spring did the first deep-sea drilling ever attempted while testing equipment and techniques in the Pacific Ocean. Successful tests by the CUSS I open the way for the deepest effort of all, the Mohole.

JOSEPH BAYLOR ROBERTS, NATIONAL GEOGRAPHIC STAFF

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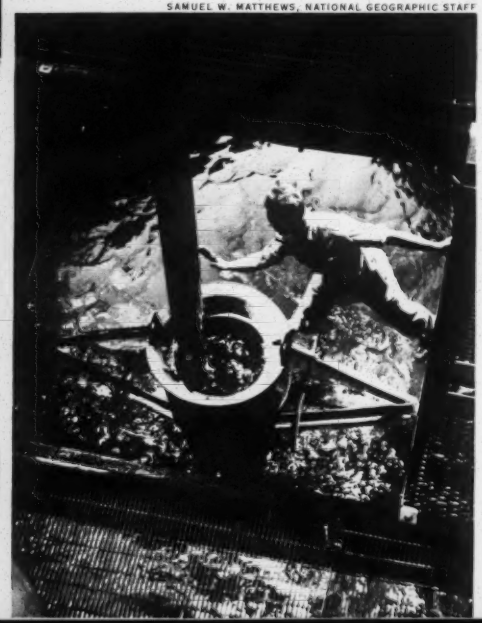
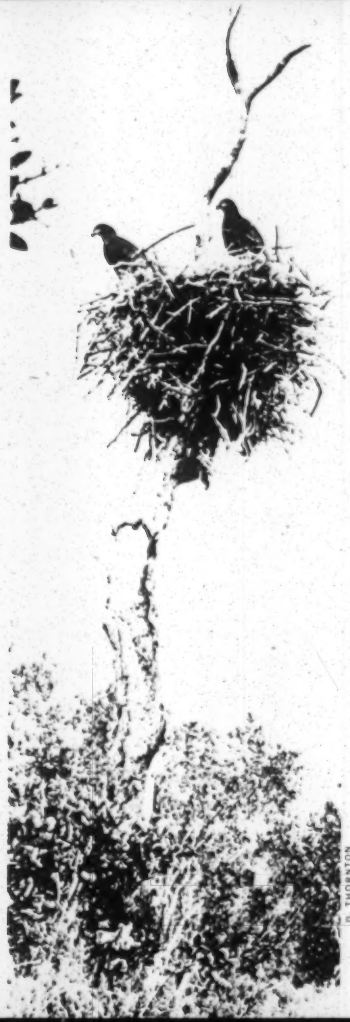


Scientists believe Earth has layers like an onion. The four major layers are the outer crust; the mantle, an 1,800-foot-thick mass of rock; the outer core, 1,360 feet thick, believed to be molten nickel-iron; and the inner core, 815 miles in diameter, thought to be solid metal.

The crust, which is the only part of the onion that man has any direct evidence about, is a thin skin, averaging only 10 miles through. The border between it and the mantle beneath is known as the Moho, after a Yugoslavian scientist who discovered it by timing earthquake waves. The hole through the Moho is naturally called the Mohole.

Since the crust is much thinner under the oceans than under the continents, the Mohole drillers work from a ship, using adaptations of the rigs designed for offshore drilling of oil wells.

Under the continents, the crust is at least 80,000 feet thick. To penetrate it would require a drill pipe so long it would break of its own weight. (The deepest hole drilled on land is 25,340 feet deep.) Under the sea,



D. THORNTON

The outspread wings of the white-headed eagle now appear on dollar bills, coins, medals, flagstaffs, and the Great Seal of the United States.

The bald eagle is named from its white (but feathered) head. The white head and tail feathers develop at maturity, usually when the bird is three years old. Outstretched wings measure a good seven feet.

Bald eagles build their nests, or eyries, as high as possible. usually in an old tree 60 or 80 feet from the ground, near lakes, oceans, or rivers. The same pair of eagles return to their eyrie year after year, adding to the nest each season. One giant nest, occupied continuously for 36 years, weighed two tons when felled by the wind.

The male eagle, smaller than his mate, shares nest-building and incubating, and helps feed the growing eaglets. After about a 35-day incubating period, two or three downy birds hatch. The parents take turns bringing home fish, small mammals, or reptiles. As babies wait anxiously (right) the mother tears a fish into bite-size pieces.

Trying out their powerful muscles, eaglets sweep across the eyrie, tossing twigs about, and flapping perhaps 10 feet into the air. The 12-week-old fledgling at right clings hard to a stub as he practices flight. By 13 weeks he has grown full size and is ready for extended voyages.

Soon the young bird spirals among the clouds, delighting in his new freedom and strength. Then, with wings steady, he glides swiftly to the water to snatch a fish.

Eagles will catch ducks or geese for a meal, but usually when the birds are exhausted or sick. Dead animals and fish are also acceptable. Franklin criticized the eagle because it frightens fish hawks into dropping their catches, then grabs the fish for itself in mid-air.

FREDERICK KENT TRUSLOW

UMI

BALD EAGLE

Vanishing American

KARL W. KENYON

WITH ITS MIGHTY beak open in a defiant scream, its sharp claws at the ready, the bald eagle seems master of the skies, with little reason to fear anything. Yet today, this strong-winged beauty is in serious trouble.

An eagle needs room; people need room, too. Since people have more power than eagles, the feathered symbol of America is in danger of being crowded into oblivion by Americans.

FREDERICK KENT TRUSLOW

No one knows exactly how many of these glorious birds are left in the United States; the best guess is less than 500 pairs, outside of Alaska. As more and more swamps are drained, and real estate developers move in on more shoreline property, it seems likely that the water-loving birds will decline even more.

Today, you are most likely to see a bald eagle in Florida, Alaska, around the Chesapeake Bay, or along the Mississippi River. (The National Audubon Society, 1130 Fifth Avenue, New York 28, N.Y., would like to know about any bald eagles you see. It has launched a nationwide survey to find out how many of the birds are left, and where they live.)

The free-soaring eagle has long been a symbol of nations. Since the dawn of history, these fierce-eyed, majestic birds have been admired. The ancient Greeks stamped eagles on their coins. Gold eagles decorated the battle standards of Rome's legions. Kings adopted the birds as tokens of their own valor and strength.

When the United States was founded, the bald eagle was believed to live only in North America, and thus was a fitting symbol of the new country. (Ironically, in view of the Cold War, it has been discovered that the bald eagle is a Russian bird, as well. It also breeds on the eastern edge of Siberia.)

Benjamin Franklin objected to the symbol, calling the bald eagle "a bird of bad moral character . . . too lazy to fish for himself." He proposed the wild turkey instead, but was voted down.

"The Taj Mahal is for the dead," he has remarked, "Bhakra (dam) is for the living."

A dam's dramatic effect on human life can be seen at Pipra, India, where the Rihand River is controlled. Until recently, Pipra was a backward village of mud huts and famine-haunted people. Eight months of the year the river was dry. When the monsoon came, floods ravaged the countryside.

Now, the 20th century has arrived. Men who formerly scratched the soil in resignation are proud construction workers with weekly pay envelopes. Neat dwellings have replaced hovels.

As the dam's power production mounts, another revolution will come. Manufacturers of cement, paper, aluminum, and fertilizer plan to move in to provide more jobs. For those remaining on the soil, the irrigation water and cheap fertilizer mean more abundant crops.

Similar stories could be told of places around the world. Australia is reversing the flow of an entire watershed by a series of dams to make arid land in the interior fruitful.

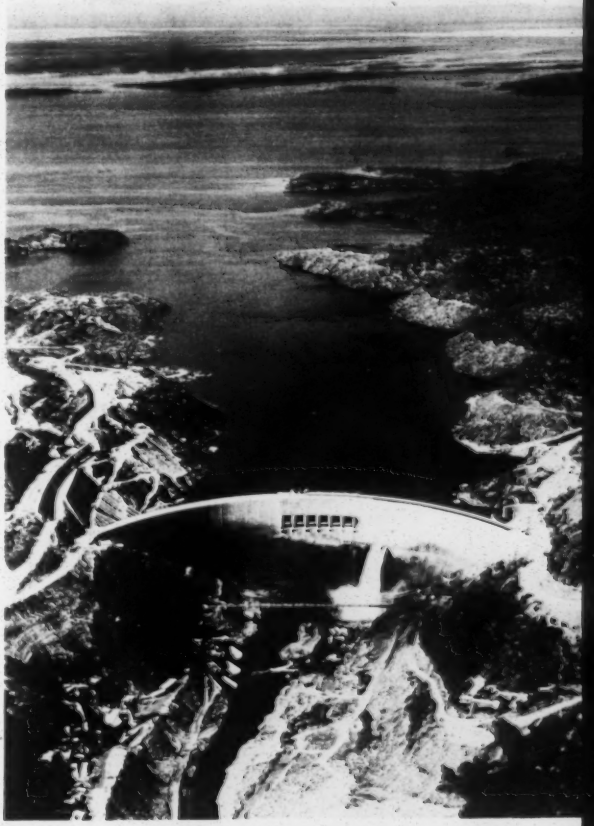
Near East countries, oil-rich and water-poor, are dotted with projects. They hope to revive in ancient soil the fertility known to have existed there in the time of the Babylonians and Sumerians.

Three mammoth dams are rising in Siberia, near the Mongolian border, to spin the wheels of new industry.

Europe is not lagging. In Spain's bone-dry Extremadura, a large project has increased crop yields eight to ten times on the watered farms. Switzerland in 1957 completed the world's highest dam—the 780-foot Mauvoisin. Germany, seeking more power for the Ruhr, is erecting dams on the River Bigge. France is building a series of waterworks on the Rhône. Italy hopes to revitalize the island of Sardinia with six big dams.

The Western Hemisphere, too, is busy with its waterworks. Dams are abuilding in South America from Argentina to Venezuela. Mexico, already reaping benefits from completed dams, plans more. The United States and Canada have recently agreed on a complete harnessing of the Columbia River.

As the world population continues to increase, man will have to make full use of all of Earth's resources. Rivers have an important advantage over other sources of power. Coal, oil, gas, even the uranium in atomic furnaces, vanish after giving up their energy. The river goes on forever. F.S.



W. D. VAUGHN

UMI

The Living River, No. 5

THE TORRENTS TAMED

NATIONAL GEOGRAPHIC PHOTOGRAPHER VOLKMAR WENTZEL

THE PRINCIPLE of water power is clearly demonstrated by this boy's musical toy in Austria. Water from the trough falls on the paddles of the wheel, keeping it constantly turning. A shaft fitted to the wheel's hub turns with it, tripping the hammers to produce a melody.

Thus the power generated by falling water is harnessed to the boy's purpose. Larger water wheels ground the American settlers' corn, and powered New England's infant industries.

Today water wheels harness great rivers around the world to spin out electricity. The principle is the same, the only differences are in size and use.

The boy's dam, out of the picture to the left, raises the level of his power canal (the trough) to provide a waterhead of about one foot. The world's highest dam soars 780 feet. One under construction will reach 870 feet.

Waterhead is the key; it is the height the dam raises the river above its normal bed. The higher the water, the farther it will fall and the more power it will produce.

In the picture at left, the process is easy to understand. But it would take X-ray eyes to see into the spinning turbines and generators of a modern hydroelectric plant.

The turbines spin under the water's force, whirling magnets past coils of copper wire or bars. This produces an electric current in the wires, which can be used to light houses or spin machines in factories.

Since World War II the geography of every continent has been changed by a boom in dam building. Waters caught in made-to-order lakes and inland seas are giving new food to the hungry, new power to industry, and greater safety from floods.

Water flows year round on dusty plains of India which once waited thirstily for the monsoon rains. Electricity lights the long nights of Siberia. In Africa, the raging Zambezi River lies docile behind the great Kariba Dam (right), ready to give light and power to an Africa waking from a long sleep.

North of Kariba, in the valley of the Nile, work continues on the Aswan High Dam, whose huge lake will drown monuments thousands of years old, but bring a new life to millions of Egyptians.

Nowhere are dams more important than in Asia, which must somehow feed a huge population that is increasing at frightening speed.

In India, dams are so vital that Prime Minister Nehru calls them "modern temples," and "new places of pilgrimage."

CHARLES W. HERBERT

The River Pours Life On Desert Sands

Among the bare, brown hills of the California-Arizona border, Imperial Dam captures the Colorado River to bring green life to desert wastes in both states. The All American Canal, foreground, carries irrigation water to California's Imperial Valley, one of the world's richest agricultural areas. Before irrigation, it was a dry sink. The Gila Main Canal, leading off to the right, takes water east to Arizona farmers. Desilting basins in right center remove mud gouged out by the Colorado on its 300-mile journey downstream from Hoover Dam.

In the citrus groves of the Imperial Valley, growers estimate it takes about 1,250 glasses of irrigation water to make one glass of orange juice. These farmers say, "We don't pray for rain, we telephone for it." A call to the irrigation district brings the amount of water needed. Real rain—some three inches falls each year—is unimportant.

UMI